

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (currently amended): ~~A P~~polarization mode dispersion (PMD) controller device for controlling ~~the a~~ state of polarization of an incoming optical light wave, in particular in a terabit optical network, ~~the device~~ comprising:

~~a dispersion compensation unit and an adaptation control unit, wherein the dispersion compensation unit is fed with~~ which receives an the incoming optical light wave, splits the incoming optical light wave into a first optical signal and a second optical signal and outputs an equalized optical light wave, wherein the dispersion compensation unit comprises a ~~multitude~~ plurality of compensation stages ~~processing the optical light wave, wherein each compensation stage of the plurality of compensation stages comprises a feed-forward signal tap which taps the second optical signal and provides a feed-forward signal and a tunable phaseshifter which tunes the second optical signal, and wherein the plurality of compensation stages are connected in series with each connection comprising the a first waveguide which receives the first optical signal and a second waveguide which receives the second optical signal;~~

~~a distortion analyzer unit which receives the feed-forward signal and outputs information about the incoming optical light wave based on the feed-forward signal; and~~

~~an adaptation control unit which wherein the dispersion compensation unit provides an equalized optical light wave, and wherein the adaptation control unit receives the information~~

about the incoming optical light wave from the distortion analyzer unit and controls the dispersion compensation unit by tuning the tunable phaseshifter of each compensation stage based on said information.

~~wherein that at least one feed-forward signal tap is provided tapping the optical light wave inserted into one of the compensation stages,~~

~~that the feed-forward signal(s) tapped by the feed-forward signal tap(s) is(are) fed into a distortion analyzer unit,~~

~~and that the distortion analyzer unit provides the adaptation control unit with information about the incoming optical light wave for setting the dispersion compensation unit.~~

2. (currently amended): PMD controller device according to claim 1, wherein only one feed-forward signal tap is provided ~~tapping which taps~~ the incoming optical light wave and is inserted into the a first compensation stage.

3. (currently amended): PMD controller device according to claim 1, wherein a ~~multitude plurality~~ of feed-forward signal taps is ~~are~~ provided ~~tapping which tap the second optical light wave signal as and are each of the feed-forward signal taps of the plurality of feed-forward signal taps are inserted at different compensation stages each.~~

4. (currently amended): The PMD controller device according to claim 1, wherein the distortion analyzer unit determines the state of polarization (SOP) of the incoming optical

light wave as a function of the frequency of the incoming optical light wave based on the feed-forward signal provided from each compensation stage of the plurality of compensation stages(s).

5. (currently amended): The PMD controller device according to claim 1, wherein the distortion analyzer is suitable for analyzing a not polarization scrambled signal.

6. (currently amended): The PMD controller device according to claim 1, wherein at least one feed-forward signal tap comprises a wavelength demultiplexer unit, and ~~that the~~ distortion analyzer unit ~~is fed with the~~ receives demultiplexed signals provided by the at least one wavelength demultiplexer unit(s).

7. (currently amended): The PMD controller device according to claim 1, wherein the dispersion compensation unit further comprises a planar light wave circuit (PLC) with comprising a polarization splitter at the a signal input of the PLC, a ~~multitude~~ plurality of 3 dB couplers and ~~preferably a polarization combiner at the a signal output of the PLC, wherein these components of the PLC~~ the polarization splitter, the plurality of 3 dB couplers and the polarization combiner are connected in series, with each connection comprising ~~a the~~ the first waveguide and ~~a the~~ the second waveguide comprising a the tunable phaseshifter.

8. (currently amended): The PMD controller device according to claim 1, wherein the PMD controller device further comprises a feedback signal tap tapping which taps the equalized optical light wave, and wherein that the adaptation control unit is fed with the receives a feedback signal provided by the feedback signal tap.

9. (currently amended): A Mmethod of operating a polarization mode dispersion (PMD) controller device, the method comprising: according to claim 8, wherein the adaptation control device dithers a number N of parameters smaller than the amount P of tuning parameters in order to optimize the feedback signal

receiving an incoming optical light wave by the PMD controller device;

splitting the incoming optical light wave into a first optical signal and a second optical signal;

inputting the first optical signal and the second optical signal into a plurality of compensation stages, wherein each compensation stage comprises a tunable phaseshifter, wherein the second optical signal passes through the tunable phaseshifter, and wherein the plurality of compensation stages are connected in series and each connection comprises a first waveguide receiving the first optical signal and a second waveguide receiving the second optical signal;

outputting a plurality of feed-forward signals from the plurality of compensation stages;

tuning each tunable phaseshifter in each compensation stage of the plurality of the compensation stages, wherein the tuning comprises shifting a phase of the second optical signal

at each compensation stage of the plurality of the compensation stages, and wherein the tuning is based on the plurality of feed-forward signals; and  
outputting an equalized optical light wave from the PMD based on the tuning.

10. (currently amended): The Mmethod according to claim 9, wherein the distortion analyzer unit determines further comprising determining the a state of polarization (SOP) of the incoming optical light wave as a function of its frequency, and that the adaptation control device uses using the SOP information for controlling the plurality of compensation stages.

11. (currently amended): The Mmethod according to claim 10, wherein the determination of operating conditions for controlling the compensation stages is accomplished by reading out a table and/or by calculation, in particular taking into account the based on experimental or numerical determined a relation between signal distortion of the incoming light wave measured by the distortion analyzer unit and the setting of the distortion compensator unit parameters which is required to improve the signal quality at the compensator unit's output tuning.

12. (currently amended): The Mmethod according to claim 10, wherein the operating conditions controlling of the compensation stages are is determined and adjusted performed continuously.

13. (currently amended): ~~Computer program for performing a method according to~~  
~~claim 9~~ A computer-readable medium storing a program for performing a method of operating a  
polarization mode dispersion (PMD) controller device, the method comprising:  
receiving an incoming optical light wave by the PMD controller device;  
splitting the incoming optical light wave into a first optical signal and a second optical  
signal;  
inputting the first optical signal and the second optical signal into a plurality of  
compensation stages, wherein each compensation stage comprises a tunable phaseshifter,  
wherein the second optical signal passes through the tunable phaseshifter, and wherein the  
plurality of compensation stages are connected in series and each connection comprises a first  
waveguide receiving the first optical signal and a second waveguide receiving the second optical  
signal;  
outputting a plurality of feed-forward signals from the plurality of compensation stages;  
tuning each tunable phaseshifter in each compensation stage of the plurality of the  
compensation stages, wherein the tuning comprises shifting a phase of the second optical signal  
at each compensation stage of the plurality of the compensation stages, and wherein the tuning is  
based on each feed-forward signal output from each compensation stage of the plurality of  
compensation stages; and  
outputting an equalized optical light wave from the PMD based on the tuning.
14. (new): The method according to claim 9 further comprising:

providing a feedback signal from the equalized optical light wave; and  
optimizing the feedback signal by dithering a number N of parameters smaller than an  
amount P of tuning parameters, wherein the tuning is based on the tuning parameters and the  
plurality of feed-forward signals.

15. (new): The PMD controller device according to claim 1, further comprising a  
feedback signal tap which taps the equalized optical light wave and outputs a feedback signal,  
wherein the adaptation control unit controls the dispersion compensation unit by tuning the  
tunable phaseshifter of each compensation stage based on the information output from the  
distortion analyzer unit and the feedback signal.